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MATRIC NO: 17/MHS01/173 DEPARTMENT: PHYSIOLOGY
COURSE CODE: MAT 104

(1) $\int \frac{2x}{\sqrt{4x^2-1}}\,dx$

Let $u = \sqrt{4x^2-1}$

$u^2 = 4x^2 - 1$

$2u\frac{du}{dx} = 8x$

$2u\,du = 8x\,dx$

$dx = \frac{u\,du}{4x}$

$\int \frac{2x}{\sqrt{4x^2-1}}\,dx = \int \frac{\cancel{2x}^{1}}{\cancel{u}} \times \frac{\cancel{u}\,du}{\cancel{4x}\,2x}$

$\int \frac{1}{2}\,du = \frac{1}{2}u + C$

$\int \frac{1}{2}\,du = \frac{1}{2}u + C = \frac{1}{2}\sqrt{4x^2-1} + C$

$\int \frac{2x}{\sqrt{4x^2-1}}\,dx = \frac{1}{2}\sqrt{4x^2-1} + C$ //

(2)

$$\int \frac{\sin^{-1}x\,dx}{\sqrt{1-x^2}} = \int \frac{\sin^{-1}x}{\sqrt{1^2-x^2}}\,dx$$

$x = \sin\theta$

$\frac{dx}{d\theta} = \cos\theta$

$dx = \cos\theta\,d\theta$

$1^2 - x^2 = 1^2 - 1^2\sin^2\theta$

$= 1^2\cos^2\theta$

$\sqrt{1^2\cos^2\theta} = 1\cos\theta = \cos\theta$

$1^2(1-\sin^2\theta)$

$\cos^2\theta + \sin^2\theta = 1$

$\cos^2\theta = 1-\sin^2\theta$

$\sin^2\theta = 1-\cos^2\theta$

$$\int \frac{\sin^{-1}x \cdot \cancel{\cos\theta}\,d\theta}{\cancel{\cos\theta}}$$

$= \int \sin^{-1}x \cdot d\theta = \int \sin^{-1}x \cdot \theta + c$

$= \int \sin^{-1}x \cdot \frac{(\sin^{-1}x)}{1} + c$

$= \int (\sin^{-1}x)^2 + c$

③ $\int (\tan x)^6 \sec^2 x \, dx$

Let $u = \tan x$

$\frac{du}{dx} = \sec^2 x$, $dx = \frac{du}{\sec^2 x}$

$\int u^6 \cancel{\sec^2 x} \cdot \frac{du}{\cancel{\sec^2 x}}$

$= \int u^6 \cdot du$

$= \frac{u^7}{7} + C$

$\int (\tan x)^6 \sec^2 x \, dx = \frac{(\tan x)^7}{7} + C$

Where C is the constant for the integration.